

Nicholas Navin, PhD Associate Professor, Genetics and Bioinformatics Director, CPRIT Single Cell Genomics Center Co-Director, Sequencing Core Breast Cancer Evolution through the Lens of Single Cell Genomics

Dr. Nicholas Navin is an associate professor in the Department of Genetics and the Department of Bioinformatics and Computational Biology at the MD Anderson Cancer Center. He is the director of the CPRIT 5M Single Cell Genomics Center and the co-director of the Sequencing and Microarray Core Facility. Dr. Navin completed his Ph.D. and postdoctoral studies at the Cold Spring Harbor Laboratory and Stony Brook University. Dr. Navin is internationally recognized for his seminal work on developing single cell DNA sequencing techniques. Dr. Navin developed the first single cell DNA sequencing method (Navin et al. 2011 Nature, citations: 1851) which played a pivotal role in establishing the field of single cell genomics. His research work focuses on applying single cell genomic technologies to understand the evolution of diseases such as cancer, where they have elucidated complex biological processes including invasion, metastasis and therapy resistance. In his previous work, he identified a punctuated model of copy number evolution in breast cancer and discovered that multiple clones co-invade surrounding tissues in premalignant breast cancer. His work has also shown transcriptional reprogramming and adaptive selection of clonal genotypes during chemotherapy resistance in triple-negative disease. Dr. Navin's laboratory is actively developing new genomic technologies for single cell sequencing, plasma DNA and spatial genomics, as well as computational approaches to analyze the resulting large-scale datasets. In recognition for his work, Dr. Navin has been the recipient of many prestigious awards, including the AAAS Wachtel Award, Damon Runyon Innovator Award, ACS Research Scholar Award, Andrew Sabin Fellowship, Wilson Stone Award, Randall Innovator Award, Living Legend Basic Science Award and is a finalist for the Blavatnik Award in Life Sciences.

Abstract: Single cell genomics is a relatively new field that has impacted many disciplines, including cancer research.

University of Texas MD Anderson Cancer Center

In this talk I will discuss our efforts to develop and apply single cell DNA sequencing technologies to understand breast cancer invasion, metastasis and therapeutic resistance. I will also discuss our efforts to apply single cell transcriptomic methods to delineate the tumor microenvironment and understand the role of the stroma and immune cells in breast cancer progression. To better understand the biology of normal breast tissues we are leading a 'Breast Cell Atlas' project that is using single cell and spatial methods to define the cell types and cell states of normal human breast. This data serves as an important reference for understanding microenvironment reprogramming in premalignant DCIS breast cancer and invasive disease.